ра потока пара в реакционной камере достигала до 1000 °C и более. Схематично генератор плазмы изображен на рис. 1.

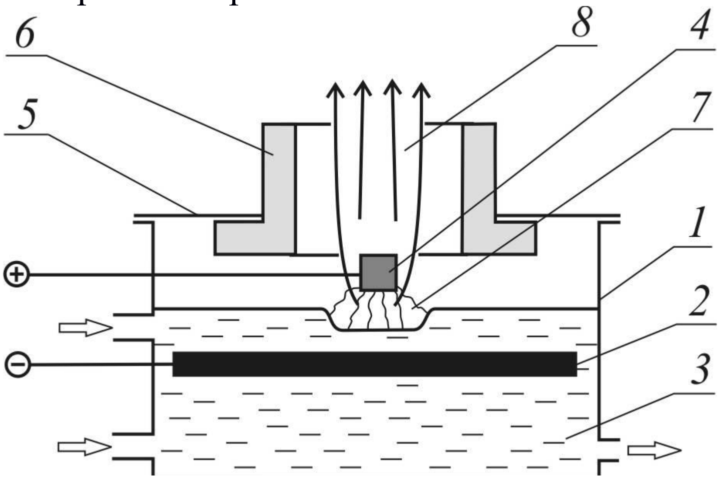

Рис. 1. Генератор плазмы: *1* − корпус; *2* − токоподвод; *3* − жидкий катод (электролит); *4* − водоохлаждаемый анод; *5* − крышка; *6* – выходное сопло; *7* − газоразрядная зона; *8* – плазменный поток.

Генератор плазмы был опробован для газификации пластмассовых отходов. В плазменный поток подавались летучие продукты термического разложения отходов полиэтилена и полиэтилентерефталата. Состав полученного синтез-газа анализировался хроматографом «Кристалл 2000М». Синтез-газ состоял из водорода, оксидов углерода и газообразных углеводородов.

Таким образом, в данной работе экспериментально показано, что в высокотемпературном потоке пара, генерируемого газовым разрядом с жидким катодом, условия вполне достаточны для газификации пластмассовых отходов.

1. Gibadullina G.R., Tazmeev A.H., Tazmeeva R.N., International Journal of Applied Engineering Research, Volume 10, Issue 24, pp.45015-45021, (2015).
2. Ложкин С.Г., Котляр Э.А., Твердые бытовые отходы, №1, С. 30-31, (2015).

STRUCTURE AND PROPERTIES STUDY OF V-BASED MEMBRANE ALLOYS FOR ULTRA-HIGH PURITY HYDROGEN PRODUCTION

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Development of ultra-high purity hydrogen production technology has attracted renewed and ever-increasing attention around the world in recent years, mainly due to hydrogen is a high-quality and clean energy carrier. With reasonable permeabilities and other key properties the alloys of Pd are rightfully considered the benchmark alloy membrane material, but the high cost of Pd remains a concern. Alloys based on (V, Ta, Nb) body-centred cubic metals having high hydrogen solubility are one of the leading alternatives to Pd alloys. Hence V group metals alloys have come under intensive scrutiny in the past two decades.

The investigations of structure and properties of the vanadium-based alloys $V_{85}Ni_{15}$, $V_{90}Ti_{10}$, $V_{90}Co_{10}$ at.% were pursued by the authors. High-purity (>99.95 mass.%) elements were melted into ingots on a water-cooled copper hearth using a vacuum/argon arc melter.

The obtained alloys were subjected to hydrogen permeability tests on apparatus [1]. The XRD analysis of the obtained alloys was performed with a XRD 7000C Shimadzu diffractometer. An Olympus optical microscope was used to observe the microstructures of the polished and etched samples. Vickers micro-hardness measurements of as-cast samples were carried out using a digital micro-hardness tester Micromet-5103 Buehler. Besides an assessment of defect structure (void size and volume) was carried out. The estimation of hydrogen permeability was performed by the experimental measurements under nonstationary conditions [2]. The data about properties the alloys are presented in Table.

Table. Characteristics of the alloys

Alloy	**HV, load 50 g**	**Grain size, μm**	**Lattice parameter, Å**
$V_{85}Ni_{15}$ at.%	447	150-300	2.9935
$V_{90}Ti_{10}$ at.%	360	60-200	3.0747
$V_{90}Co_{10}$ at.%	265	100-250	3.0086

The reported study was funded by RFBR according to the research project No.16-38-00759 мол_а, the equipment of Shared Research Center Ural-M was used to make this study.

1. Sidorov N.I., Piven V.A., et al., *Butlerov communications,* 39, 8, 139-142 (2014).
2. Kozhakhmetov S., Sidorov N., et al., *J. Alloys Comp.,* 645, S36–S40 (2015).